

IN THE CLAIMS

Please amend the claims as follows:

Claim 1 (Currently Amended): A magnetoresistive head, comprising:

a magnetoresistive film including first and second magnetization free layers, an intermediate layer sandwiched between the first and second magnetization free layers, an underlayer and a protective layer, which are stacked in the order of the underlayer, the first magnetization free layer, the intermediate layer, the second magnetization free layer and the protective layer and arranged to be substantially perpendicular to an air-bearing surface, each magnetization direction of which first and second magnetization free layers is allowed to vary independently in response to a signal magnetic flux from a medium, wherein first and second magnetization free layers produce a magnetoresistance effect in accordance with the magnetization directions thereof; and

a first electrode electrically connected with the underlayer and a second electrode electrically connected with the protective layer, the first and second electrodes allowing a current to flow in a direction substantially perpendicular to the plane of the magnetoresistive film; and

a first magnetic shield arranged on an opposite side of said first electrode from said underlayer and a second magnetic shield arranged on an opposite side of said second electrode from said protective layer.

Claim 2 (Canceled).

Claim 3 (Currently Amended): The magnetoresistive head according to claim 1 [[2]], wherein each of the magnetic shields is in contact with the first electrode or with the second electrode.

Claim 4 (Original): The magnetoresistive head according to claim 1, wherein the intermediate layer is formed of a conductive nonmagnetic layer.

Claim 5 (Original): The magnetoresistive head according to claim 4, wherein the intermediate layer is formed of at least one kind of metal selected from the group consisting of Be, Al, Mg, Ca, Cu, Au, Ag, Rh, Ru and Ir.

Claim 6 (Withdrawn): The magnetoresistive head according to claim 1, wherein the intermediate layer is of a three-layered structure comprising a pair of first intermediate layers in contact with the first magnetization free layer and the second magnetization free layer, respectively, and a second intermediate layer interposed between the paired first intermediate layers.

Claim 7 (Withdrawn): The magnetoresistive head according to claim 6, wherein the first intermediate layer is formed of at least one kind of a metal selected from the group consisting of Cu, Au, Ag, Rh, Ru and Ir, and the second intermediate layer is formed of at least one kind of a metal selected from the group consisting of Be, Al, Mg and Ca.

Claim 8 (Withdrawn): The magnetoresistive head according to claim 1, wherein the intermediate layer is formed of an oxide layer.

Claim 9 (Withdrawn): The magnetoresistive head according to claim 8, wherein the oxide layer is formed of at least one layer selected from the group consisting of an Al oxide, a Si oxide, a Fe oxide, a Cr oxide, a Ta oxide, a Ni oxide and a perovskite type oxide.

Claim 10 (Withdrawn): The magnetoresistive head according to claim 8, wherein the oxide layer has a thickness of about 5 nm or less.

Claim 11 (Withdrawn): The magnetoresistive head according to claim 1, wherein the intermediate layer is formed of a stacked film of [a metal layer/an oxide layer or nitride layer], or a sandwich film of [a metal layer/an oxide layer/a metal layer] or [a metal layer/a nitride layer/a metal layer].

Claim 12 (Withdrawn): The magnetoresistive head according to claim 11, wherein the oxide layer is formed of at least one layer selected from the group consisting of an Al oxide, a Si oxide, a Fe oxide, a perovskite type oxide, a Ta oxide, a Cr oxide, and a Ni oxide.

Claim 13 (Previously Presented): The magnetoresistive head according to claim 1, further comprising a pair of hard biasing films, one of said hard biasing films arranged on each end of the magnetoresistive film in a track width direction, said hard biasing films imparting magnetic biases to the first and second magnetization free layers in substantially the same direction.

Claim 14 (Withdrawn): The magnetoresistive head according to claim 1, further comprising:

a pair of first antiferromagnetic films, one of said first antiferromagnetic films arranged on each said end of the first magnetization free layer in a track width direction so as to impart a magnetic bias to the first magnetization free layer in a predetermined direction;
and

a pair of second antiferromagnetic films, one of said second antiferromagnetic films arranged on each said end of the second magnetization free layer in a track width direction so as to impart a magnetic bias to the second magnetization free layer in a predetermined direction.

Claim 15 (Withdrawn): The magnetoresistive head according to claim 14, wherein the direction of the magnetic bias imparted to the first magnetization free layer by the pair of first antiferromagnetic films and the direction of the magnetic bias imparted to the second magnetization free layer by the pair of second antiferromagnetic films make an angle ranging from about 60° to 120° with each other.

Claim 16 (Withdrawn): The magnetoresistive head according to claim 14, wherein each of a distance between the pair of first antiferromagnetic films and a distance between the pair of second antiferromagnetic films is about 0.5 μm or less.

Claim 17 (Withdrawn): The magnetoresistive head according to claim 16, wherein each of the distance between the pair of first antiferromagnetic films and the distance between the pair of second antiferromagnetic films is about 0.2 μm or less.

Claim 18 (Original): A perpendicular magnetic recording-reproducing apparatus, comprising:

a perpendicular magnetic recording medium; and

a magnetoresistive head according to claim 1 arranged to face the perpendicular magnetic recording medium.

Claim 19 (Currently Amended): A magnetoresistive head, comprising:

a magnetoresistive film including first and second magnetization free layers, an intermediate layer sandwiched between the first and second magnetization free layers, which are stacked in the order of the first magnetization free layer, the intermediate layer and the second magnetization free layer and arranged to be substantially perpendicular to an air-bearing surface, each first and second magnetization free layer having a magnetization direction which is allowed to vary independently in response to a signal magnetic flux from a medium, wherein the first and second magnetization free layers produce a magnetoresistance effect in accordance with the magnetization directions thereof; and

a first electrode electrically connected with the first magnetization free layer and a second electrode electrically connected with the second magnetization free layer, the first and second electrodes allowing a current to flow in a direction substantially perpendicular to the plane of the magnetoresistive film; and

a first magnetic shield arranged on an opposite side of said first electrode from said first magnetization free layer; and

a second magnetic shield arranged on an opposite side of said second electrode from said second magnetization free layer.

Claim 20 (Canceled).

Claim 21 (Currently Amended): The magnetoresistive head according to claim 19 [[20]], wherein each of the magnetic shields is in contact with the first electrode or with the second electrode.

Claim 22 (Previously Presented): The magnetoresistive head according to claim 19, wherein the intermediate layer is formed of a conductive nonmagnetic layer.

Claim 23 (Previously Presented): The magnetoresistive head according to claim 22, wherein the intermediate layer is formed of at least one kind of metal selected from the group consisting of Be, Al, Mg, Ca, Cu, Au, Ag, Rh, Ru and Ir.

Claim 24 (Previously Presented): The magnetoresistive head according to claim 19, further comprising a pair of hard biasing films, one of said hard biasing films arranged on each end of the magnetoresistive film in a track width direction, said hard biasing films imparting magnetic biases to the first and second magnetization free layers in substantially the same direction.

Claim 25 (Previously Presented): A perpendicular magnetic recording-reproducing apparatus, comprising:

a perpendicular magnetic recording medium; and

a magnetoresistive head according to claim 19 arranged to face the perpendicular magnetic recording medium.